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TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY
BIOMEDICAL SCIENCES

No. 8

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

AGROTECHNOLOGY

UDC 626.845 (477.7)

USE OF 'FREGAT' SPRINKLING MACHINES IN SOUTHERN UKRAINE

Moscow ZEMLEDELIYE in Russian No 5, 1977 pp 59-60

[Article by N.F. Shtangey, Candidate of Agricultural Sciences and A.I. Shtangey, at the Kamensko-Dneprovskiy Experimental Land Reclamation Station: "Fregat for Irrigation"]

[Text] On irrigated lands in the southern Ukraine, winter wheat is sown as a rule following corn for green fodder or silage, peas for grain and at times even following winter wheat. Thus importance is attached to ensuring that the periods between harvesting the crops and plowing the soil are held to a minimum. However, quite often the periods between these operations are as long as 30 days and more, with the plowing being carried out at times in early September. Under our conditions the best period for sowing winter wheat is 10-20 September.

In the absence of precipitation during the summer-autumn period the arable land becomes lumpy, the soil does not pack well and it settles only following irrigation.

In the southern Ukraine, considerable plantings of agricultural crops are irrigated using the wide-swath "Fregat" sprinkling machines.

The average duration of irrigation using a "Fregat" sprinkling machine is 14-15 hours daily. When it is operated at two positions, water supply irrigation for a norm of 800-1,000 cubic meters per hectare can be carried out in just 25-30 days. However the capability of the "Fregat" to advance over lumpy and unsettled arable land is difficult even when a low (250-300 cubic meters per hectare) irrigation norm is employed. A considerable amount of run-off is observed on large slopes (0.01-0.02) during irrigation work. In addition to uneconomic use of irrigation water and erosion of the upper layer of fertile soil, this results in the formation of large gullies along the slope and this severely inhibits the movement of the "Fregat" machine from one position to another. In the zone of the terminal sprinkling units, extensive lodging of the plants is observed during foliar waterings.

In view of the above, during 1975 and 1976, at the Orlyanskiy Kolkhoz in Vasil'yevskiy Rayon, Zaporozhskaya Oblast, the lands of which are located within the Severo-Rogachikskiy irrigation system, we undertook a study of irrigation carried out on winter wheat and other crops using the "Fregat" machine. Observations were taken from a field 756 hectares in size, on which seven machines (in a 14 point variant) were being operated at two positions.

The irrigation norm plan for winter wheat called for 2,800 cubic meters per hectare, with three foliar irrigations of 600 cubic meters per hectare each and one water supply irrigation -- 1,000 cubic meters per hectare. In 1975 and 1976, on level fields containing plantings of winter wheat, barley prior to the commencement of heading, fodder beets and other agricultural crops, water supply irrigation was replaced by pre-sowing and autumnal foliar irrigation using a norm of 230-300 cubic meters per hectare for each. Moreover, winter wheat was sown immediately following irrigation of certain sectors and without waiting for a complete rotation of the sprinkling supply line. This irrigation norm was fully adequate for moistening the root-inhabiting soil layer and for obtaining healthy seedlings. Following the autumn foliar watering, the plants entered the winter phase in a well developed state.

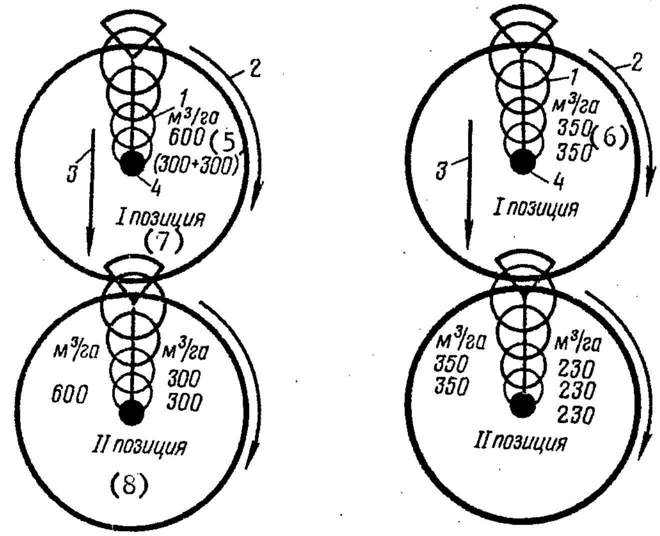
During the spring-summer period, foliar waterings were carried out using an irrigation norm of 600 cubic meters per hectare; this was supplied during several rotations of the sprinkling supply line.

The "Fregat" can be moved from one position to another by transporting the supply line either from the side of the stationary mounting or from the side of the console unit. On the majority of farms located within the Severo-Rogachikskiy irrigation system, the supply line is transported from the side of the stationary mounting.

If the "Fregat" sprinkling machine is operated from one position, an irrigation norm of 600 cubic meters per hectare can be supplied during one or two rotations of the sprinkling supply line; moreover, it can be installed in any position relative to the stationary mounting; when operated from two positions -- at the first position -- during one or two rotations of the supply line (see Figure) and at the second position during two passes -- for the first half of the circle and during one -- the second half. When this method is employed, the sprinkling supply line returns to its initial position following completion of the watering operation. Once the "Fregat" has moved once again to the first position, the second watering is carried out in reverse sequence and so forth.

For an irrigation norm of 300 and 600 cubic meters per hectare, the handle for controlling the speed of movement of the machine must be set at "4" or "2" of the double line (up and down) of the hydraulic cylinder for the last wagon.

Technology for Irrigating Agricultural Crops With the "Fregat" Sprinkling Machine Being Operated From Two Positions



Irrigation norm of 600 cubic meters per hectare

Irrigation norm of 700 cubic meters per hectare

Key:

1. Sprinkling supply line
2. Direction of movement of supply line
3. Direction of movement of machine to second position
4. Hydrant
5. 600 cubic meters per hectare (300 +300)
6. 350 cubic meters per hectare
7. 1st position
8. 2d position

On fields having considerable slopes, irrigation is carried out during the winter wheat and barley heading phase using a norm of 600 cubic meters per hectare. This norm should not be delivered during just one rotation of the supply line, since this results in extensive lodging of the plants, in the formation of strong run-off and in a deterioration in the movement capability of the machine. In such instances the watering should ideally be carried out gradually using a norm of 700 cubic meters per hectare (see above Figure).

Winter wheat responds well to foliar waterings carried out prior to sowing and also during the autumn and spring-summer periods. The average norm is 350 cubic meters per hectare and the water is supplied during 1.5-2 rotations of the "Fregat." For example, in 1965 the irrigation norm for 216 hectares of "Kavkaz" winter wheat at the Orlyanskiy Kolkhoz was 2,400 cubic meters per hectare. In the autumn, two pre-sowing waterings were carried out with a norm of 300 cubic meters of water per hectare being employed for each and in the spring and summer -- three foliar waterings of 600 cubic meters per hectare each. Moreover, this latter irrigation

norm was supplied during two rotations of a "Fregat" supply line (300 + 300 cubic meters per hectare). The average productivity of the winter wheat under such an irrigation regime was 45 quintals per hectare. On individual tracts and depending upon the soil fertility and predecessor crops employed, as much as 41-48.5 quintals of grain were obtained.

In 1975, following the harvesting of winter rye for green fodder from an area of 54 hectares at this same farm, 30 tons of farmyard manure, 2 quintals of superphosphate and 1.5 quintals of ammonium nitrate were applied to each hectare of soil. Thereafter, corn for silage was sown.

Regular waterings using a norm of 250 cubic meters per hectare began on 20 June. This required around-the-clock operation of a "Fregat" machine. In all, 10 waterings constituting an irrigation norm of 2,500 cubic meters per hectare were carried out during the period beginning on 20 June and ending on 1 August.

Despite the extremely dry conditions experienced during the summer of 1975, this irrigation regime made it possible to obtain 500 quintals of corn fodder per hectare from this field. Following the harvesting of the corn, the soil was plowed and winter wheat sown.

Our observations carried out at the Orlyanskiy Kolkhoz revealed that regular waterings using the "Fregat" sprinkling machine and average watering norms ensure high yields for the irrigated crops. Watering norms in excess of 600 cubic meters per hectare tend to inhibit the movement of a "Fregat" machine out on the fields and they increase slope and linear run-off, a factor which quite often results in soil erosion and delays in carrying out the planting of winter crops.

CSO: 1870

AGROTECHNOLOGY

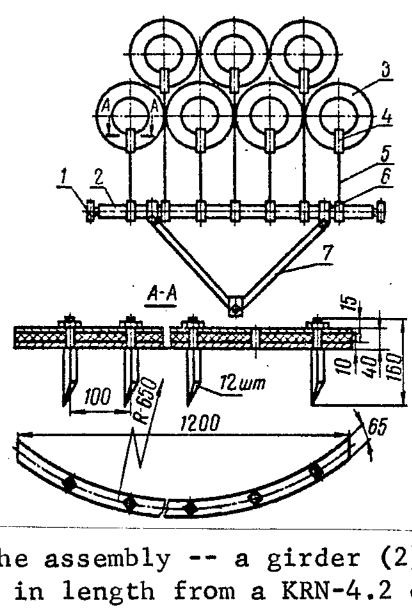
ASSEMBLY FOR IMPROVED PROCESSING OF HAYING AND PASTURE LANDS

Moscow ZEMLEDELIYE in Russian No 5, 1977 p 56

[Article by B.N. Volkov, chief engineer for the Agricultural Production Administration of the Slavskiy Rayon Executive Committee in Kaliningradskaya Oblast: "For Tending the Meadows"]

[Text] One widespread method for carrying out surface improvements in haying and pasture lands consists of leveling off small hills and removing old plants.

The innovators at the Kolkhoz imeni Chernyakhovskiy in Slavskiy Rayon, Kaliningradskaya Oblast, have developed a special assembly (see Figure) for this purpose. The unit has proven to be very reliable and successful in its operation.



The supporting part of the assembly -- a girder (2) with a rectangular cross section 4.5 meters in length from a KRN-4.2 cultivator that was written off. Seven discarded tractor cylinders 12 X 38" are attached to the girder at intervals of 0.7 meters by means of cables or wire 1.5-2 meters

in length -- 3 of the cylinders fulfill the role of working organs. Each cylinder has 12 teeth on its outer surface, installed at a distance of 100-110 millimeters from one another. Two wheels 350-400 millimeters in diameter provide support for the girder. The assembly is connected to the towed angle bar of the tractor by means of two brackets (6) with lugs and braces (7). During movement of the assembly, the working organs (cylinders) press down upon the small mounds and hillocks of grass without damaging the sod and the teeth loosen the surface of the soil. Fine stands of grass develop on those meadows processed using this assembly.

The productivity of the assembly when used with an MTZ-50 tractor is 16-18 hectares per shift. The assmebly can be employed successfully for harrowing autumn plowed land.

The cost to manufacture such an assembly does not exceed 50 rubles and its economic effect is 1,200 rubles annually.

7026
CSO: 1870

INDUSTRIAL MICROBIOLOGY

RIGA-BUILT BACTERIAL FERMENTERS MAKE LYSINE CHEAPLY

Moscow TEKHNIKA I NAUKA in Russian No 2, 1977 pp 16-18

[Article by E. Sorkin: "Bacteria at Work"]

[Text] "It is essential to produce more amino acids, feed antibiotics, enzymes and other products of microbiological synthesis." (Guidelines for the Expansion of the USSR National Economy for 1976-1980)

No, whatever you say, even though people are now writing in serious articles about the dangers of too many calories in our diet, and you see in front of you a juicy chop, broiled and with onions and...right away you forget about creeping arteriosclerosis and that it is necessary to leave the table with a slight sensation of hunger. And how do you fix it so that the chops become "plumper, but a little cheaper"? And really the meadows where barley and oats are grown--these are vital constituents of feed for hogs--are not growing any larger. In fact, they are shrinking.

That is why scientists are busy looking for ways of cutting down on the consumption by farm animals of green fodder and hay and at the same time, increasing the "yield" of meat. But can we really get something out of nothing? From nothing, you can get nothing, and making the digestive process more economical in animals is something you can do. And lysine helps in accomplishing this.

Lysine's role was detailed by U. Viyestur, candidate of technical sciences, head of the enzymatic processes laboratory of the Latvian SSR Academy of Sciences imeni A. Kirkhenshteyn:

"Meat proteins are built of 20 amino acids. One is lysine. A walking meat factory, let us say, a hog, gets lysine along with plant fodder. But the whole point is that in this fodder lysine is present one-half to one-third, in percentage terms, as much as in meat. Thus, corn contains 2.9 percent lysine, but meat proteins--7.1-9.1 percent (on a protein basis). The array of the other amino acids matches more closely what is needed in constituting animal tissue.

But no lysine, no meat and it ultimately determines the feed balance of the farm animal. I will try this comparison: imagine a barrel of boards of different lengths. If you pour water into the barrel, the level in the barrel will depend on the shortest board. The short board--this is lysine. You balance feed for lysine and much less is consumed per each kilogram of weight gain. Actually, in producing 1 kg of meat today about 1.65 times more plant fodder--grass, hay and grain--is used up than necessary and in spite of this, the lysine content is lower in today's meat than in future chops.

And so we see that adding lysine to the feed of farm animals on a country-wide scale can mean a very large economic benefit. From some calculations, we need about 70,000-100,000 tons of lysine a year. Today much less lysine is produced....

But where in the world can we get such a valuable product as lysine? Microbiologists pointed to the way of making it the cheapest. Scientists explained that microorganisms, in particular, bacteria, blue-green algae and certain fungi, use this lysine as in grass and meat, to form their own protein. And for this purpose they utilize the most diverse sources of carbon and nitrogen that are accessible to them. But is it not impossible to compel some kinds of bacteria to secrete lysine in the free form?

Staffers at the Institute of Biochemistry, USSR Academy of Sciences, were posed this question. They took the microorganisms Brevibacterium found in soil and irradiated them with ultraviolet rays. This exposure disturbed and altered the hereditary apparatus of the microorganisms; and it did it so successfully that the resulting mutants, on losing their ability to synthesize certain substances essential to them, began to vigorously secrete free lysine. Their lysine productivity went up by twenty times or more!

A lysine producer thus resulted. But between experiments in a laboratory test tube to high-efficiency industrial units, as we know, the path is not uncomplicated. It was traveled by the scientists from the Institute of Microbiology, Latvian SSR Academy of Sciences.

Everything started, as was told to me by the senior coworker in the bioengineering division, Candidate of Technical Sciences M. Kristapsons, with a glass cone to extract fruit juices. An ordinary cone has its stopcock at the bottom. The point is that the research group Doctor of Technical Sciences M. Beker headed first had to set up a laboratory fermenter--an apparatus for working out a technical of the microbial synthesis of lysine.

The thing was to find what the bacteria like best to "feed" on and how they should be maintained. What had to be worked out was not just a way of making lysine, but a cheap way, one not requiring overly complex apparatus and starting products in short supply.

How does one go about setting up a column fermenter holding 50 or 63 m^3, the kind used for making antibiotics, for instance? This is a cylindrical vessel

with rotating blades, where a sterile nutrient medium is periodically fed in, seeding material--the culture of microorganisms--being added to it. When air is fed into the fermenter from the bottom and the required temperature and other parameters are maintained, conditions are set up for the vital activity of the microbes. The mixer homogenizes the mass, evenly distributes in it oxygen and nutrients, but also suffers from major inconveniences: the design of the apparatus is rendered complicated and heavier, special measures are needed for sterility in the fermenter and more electric energy has to be consumed.

The Latvian scientists pondered about how to do without the mixer. And not because in the laboratory there was no tens and hundreds of cubic meters of products to handle. Here is what the fundamental solution was: force the medium to be mixed in the fermenter... air, more correctly, bubbles of air.

That is why a glass cone for fruit juices was needed. Its lower part was sawed off and replaced with a metal part. To the end was attached a tube into which sterile air was fed. And a nozzle-cone device was thus put together; for it, an author's certificate was given to its devisers--M. Beker and U. Viyestur. Why then was such a simple thing--a juice cone with a tube for admission of air--considered an invention? The scientists showed that owing to this shape, no stagnant zones formed in the vessel; air bubbles mixed the biomass well; the bacterial culture grows just as on yeast....

By the way, there is no reason for yeast here. Something not at all like yeast was used as the nutrient medium for microorganisms, molasses (it was obtained from the wastes of sugar manufacture) and corn extract. Thus this nutrition was intended not in general for the biomass growth, but for the maximum yield of free lysine. Here it was important not to overfortify and not to "overfeed" the bacteria--they had to be not more than and not less than some most productive optimum. It was also necessary to consider that the productivity of the microorganisms depends not only on the makeup of the nutrient medium; it is influenced by temperature, by the amount of air supplied, by the consistency of the medium and by a number of other factors.

The initial, primitive cone filled with cultural fluid containing microorganisms and the products of their vital activity became, to to speak, a cybernetic system, with an "input" and an "output." In principle, it could have been investigated like a "black box": without interest in what was happening in the living cells, but scrupulously recording only what is fed in at the "input"--the makeup of the biomass in the medium, the dilution factor, the intensity of aeration and so on, and what showed up at the "output"--the amount of biomass per liter of cultural fluid and the amount of free lysine.

But the investigators did not travel on this route: it is too long and besides, there was no guarantee of success. The bioengineers gadgeted the cone fermenter (by now it of course was nothing like a cone for fruit juice extraction) with all kinds of sensors; for quantitative estimates of microobjects

and situations happening in the fermenter a television type image recognition analyzer; they employed the more delicate methods of molecular biology, biochemistry and biophysics (thus, for example, electron transport in the respiratory chain in cells was studied)--and all this to develop an optimal technological set of conditions for synthesizing lysine. Lysine concentration was brought to 60 g/liter thanks to the scientifically sound regulation of parameters. This was a big success.

But the cone-nozzle device is good in the laboratory. But how can plant fermenters be used more efficiently in making lysine? It was necessary, as in the laboratory apparatus, to get by without mixers--these cumbersome reduction gears, clutches, shafts, blades--and replace them with air bubbles. The walls in the apparatus are vertical; the apparatus is large and the bubbles no long can penetrate its quite dense medium, "churn" through it and deliver oxygen uniformly to all the microorganisms. Also, each bubble in its path that is lengthy compared to the laboratory fermenter is preserved as it were and "crusts over" with a film blocking gas exchange.

And what if, along the path, of a bubble traveling upward from the bottom, it breaks and "sheds" its crust and what if the bubbles formed are directed to the stagnant zones? The design thinking of the Riga engineers found a simple and elegant solution: inside the fermenter, in several tiers horizontal partitions, so-called contact devices, had to be placed. And the openings--their arrangement and diameters--were selected by the bioengineers so that the most effective operating conditions were set up throughout the interior of the apparatus.

The conditions were made operational, but at the same time one more important engineering problem had to be solved: how could foam formation be regulated if the bubbles in their happy melee necessarily form a foam cap? An optimal ratio of liquid medium and foam had to be found. On the one hand, the bacteria feel at home in foam if it does not stagnate. On the other, we cannot allow more foam than necessary: otherwise the foam begins to be ejected from the fermenter together with its contents (there were times when this actually happened in production).

A proven agent for controlling excessive foaming is sperm oil. It has to be added to the churning contents of the fermenter and the foam layer subsides. But if we take up the problem of economizing meadow grasses, solving it with sperm whales is a bit messy. And the scientists brought up a new, integrated solution--they formulated a foam suppressor made chemically and at the same time developed two types of devices for mechanical breakup of foam. One is of the cyclone type. The foam stream driven out of the fermenter swirls into it and under centrifugal forces the liquid is separated from the gas and streams back into the fermenter. In essence, the other device operates by separating foam emulsions with a spinning rotor. The foam suppressing devices, controlled with special instruments with sensors, jump into action when the foam layer reaches the maximum height.

Now it proved possible to fill the fermenter with culture medium not to 0.6-0.65 of the volume (this is not economical), but to 0.7-0.75, which is optimal.

An even cheaper way of preparing feed concentrate was developed in the Institute of Microbiology, without separating lysine in crystalline form. Every --let us suppose--72 hr of bacteria culturing in the fermenter, the biomass formed arrives for evaporation in the vacuum still, where a liquid concentrate is obtained that is very convenient for transporting. But if in fact dry concentrate is what is needed, the liquid mass is dried in spray driers or a filler is added, for example, wheat bran, and this mixture is dried on belt driers or the fluidized layer of the driers.

But what happens with animals getting lysine concentrate in their main feed? Three-month-old calves beat their age mates by 17.2 percent in weight gain. Mean-daily weight gains of lambs given lysine were 125 g and lambs not getting lysine showed 85 g weight gain each day. The experiments on hog raising showed that adding lysine concentrate (20 g per ton) to the usual grain feed is equivalent to adding 80 kg of feed yeasts or 160 kg of pea flour. The cost of feed per quintal of weight gain was only 36 rubles, 37 kopecks. And the dependence of chick growth from lysine added to their feed is visible in Photo 6, where 30-day-old chick are shown.

Lysine's effectiveness can be featured in a separate article, and more than one, but even these few figures show how important are the results of the research by the Riga scientists. For their developments they received dozens of author's certificates and patents from foreign countries, but still.... In spite of the painstaking study of processes of microbial synthesis and the delving into their essentials, something still remained a "black box" for the researchers. This "something" is the response, for example, of the USSR Ministry of Chemical and Petroleum Machinebuilding to the proposals and even instructions to prepare and begin making new efficient equipment for microbial synthesis. There was a special decision of the State Committee under the USSR Council of Ministers on Science and Technology for the ministry to arrange for the manufacture of a prototype of the laboratory fermenter developed by the Riga researchers and to put it into series production. However, all schedules for making the prototype fell through--there has not been a rumor, not a breath heard about the schedules. But in fact, these fermenters are needed by specialists in the medical and food industries, by scientific organizations of agricultural specialization, by university laboratories....

There were negotiations with the same ministry over two of the forty fermenters at one of the biochemical plants under construction to be of the Institute of Microbiology design (with the participation of the Irkutsk Scientific Research Institute of Machinebuilding)--without mixers, but with contact devices. The drawings and essential technical documentation were sent to the appropriate enterprise.

And now assembly of the fermenters got started. The developers had wrung their hands long enough--now it is possible in production conditions to finally revise all the technical parameters of the process and to test the new apparatus. Finally, the long-awaited news arrived--the assembly was finished. But the installation of 40 units with mixers? And where are the two of them--the fruit of several years' labor, creative fire, disappointments and hopes? The "black box" gives no answer about the secrets of its interior operation: we just know that technical documentation for the new fermenters was at the "input"; operating experience with these fermenters would permit in the future the designing and building of much bigger, higher-productivity units; and at the "output" was a zero signal, simply nothing....

We have already written about difficulties still being encountered in smoothing out firm business connections between the academy institutes, on the one hand, and the industrial-sector scientific research institutes and enterprises--on the other (see "Emago--a Step Toward Automation," TEKHNIKA I NAUKA, No 8, 1975--Editor). Recently in the press there was an interview with the president of the Ukrainian SSR Academy of Sciences, Academician B. Paton; he spoke about the experience in introducing into the national economy the results of scientific developments at Ukrainian academy institutes. "One progressive form proven by practice in the Tenth Five-Year Plan," said B. Paton, "has been organizing joint work between the Ukrainian SSR Academy of Sciences and individual ministries under an integrated plan of scientific research and introduction." Industrial-sector scientific-technical societies could have the most creative participation in drawing up these plans and in checking on how they are put into effect. Throughgoing integrated planning is, obviously enough, the most fundamental solution to manufacturing problems of the kind the Riga microbiologists have run into.

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CSO: 1870

UDC 613.632:615.285.7

DEVELOPMENT OF HYGIENIC REGULATIONS DURING PERFORMANCE OF OPERATIONS IN HOTHOUSES TREATED WITH TOXIC CHEMICALS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 3, 1977 received by editors 22 Mar 76 pp 49-50

/Article by V. M. Zotov, Yu. N. Svirin and R. M. Prusakova (Orel), Institute of Labor Protection in Agriculture/

/Text/ Plant pests and diseases are systematically controlled by means of toxic chemicals at hothouse combines. To reduce the occupational risk to which hothouse workers are subjected after treating plants with toxic chemicals, it is necessary to determine the period during which the concentration of pesticides is lowered to a level ensuring safe work. The stability of pesticide aerosols in the air depends on the physical state of preparations (smoke, dust and drop and liquid particles), size of dispersed particles, climatic conditions, physicochemical properties of preparations, rates of their consumption and so forth, in connection with which the time when it is safe for hothouse workers to go out to plots after plant treatment should be established separately for every toxic chemical.

Our task was to establish the time of safe appearance at work for hothouse workers after treating plants in hothouses with such toxic chemicals as dimethyl dichlorovinyl phosphate (DDVP), zineb and benlat.

When the actual contamination of the air in hothouses with toxic chemicals was studied, the air was sampled by methods generally accepted in sanitary practice immediately after plant treatment--2½, 5, 10, 20, 30 and 40 hours after treatment. Since during the performance of various labor plant care operations a secondary contamination of the air with toxic chemicals is possible, some of the air was sampled when the green mass of plants was shaken.

Pesticides were determined by the method of thin-layer chromatography (M. A. Klisenko et al.).

On the basis of a hygienic classification of toxic chemicals (L. I. Medved') DDVP is a highly toxic pesticide (LD_{50} for rats is 25-60 mg/kg) and has a pronounced cutaneous-resorptive and inhalation effect. The maximum permissible concentration in the air of the work zone is 0.2 mg per cubic meter.

Zineb and benlat are slightly toxic pesticides (LD_{50} for rats is 1,850 mg/kg and more than 10,000 mg/kg respectively) and do not have an irritating effect when applied to the skin and mucous membranes. The maximum permissible concentration of zineb in the work zone is 0.5 mg per cubic meter.

In hothouses DDVP is applied in the form of water emulsions, the concentration of the working solution being 0.2-0.3 percent with a consumption of 6-12 kg per hectare, and zineb and benlat, in the form of suspensions, the concentrations of working solutions being 0.3-0.4 and 0.1-0.3 percent respectively with consumptions of 6-20 and 6-10 kg per hectare. The differences in the consumptions of toxic chemicals are due to the different area of the leaf surface of plants at various stages of their growth in hothouses.

The process of preparing the working solutions of toxic chemicals is mechanized. It is carried out in special tanks with a mechanical mixing of the liquid. Plants are treated manually. At the same time, hoses with water jet nozzles at the end, consisting of a tap, tube and spraying head, by means of which working plant protection units spray plants, are connected to distributing cocks.

The RU-60M respirators with filter elements of the A brand, robes, aprons, rubber boots, gloves, protective goggles and so forth are used as individual protective gear.

The data obtained on the dynamics of the content of toxic chemicals in the air of the work zone of hothouses after plant treatment are presented in the table. Immediately after plants are sprayed, the concentration of DDVP, without plant shaking, is 1.2 mg per cubic meter, which exceeds the maximum permissible concentration six times, of zineb, 0.87 mg per cubic meter (which exceeds the maximum possible concentration 1.7 times) and of benlat, 0.15 mg per cubic meter (the maximum possible concentration has not been established).

After 20 hours benlat is nonexistent in the air of the work zone of hothouses, the concentrations of DDVP and zineb are 0.01 and 0.12 mg per cubic meter respectively and after 40 hours all the toxic chemicals are nonexistent.

When the green mass of plants is shaken, the concentration of the toxic chemicals in the air of the work zone of hothouses increases by 10-26 percent.

When comparing the obtained data with the maximum permissible concentration with due regard for the degree of toxicity of the toxic chemicals, their cutaneous-resorptive effect and secondary contamination of the air from the surface of plants during plant care, it should be noted that for DDVP (consumption up to 8 kg per hectare) the period during which the concentration

of the preparation is lowered to a level ensuring safe work should be no less than 20-24 hours, for zineb (consumption up to 10 kg per hectare), 15-20 hours and for benlat (consumption up to 9 kg per hectare), 20 hours (when the maximum possible concentration is established, this period can be reduced) provided the treated premises are ventilated 1-2 hours before entering them. During a combined use of (2-3) toxic chemicals in hothouses their synergic toxic effect is possible, in connection with which the time of safe appearance at work should be selected according to the preparations remaining in the air for the longest time with an increase of 30-40 percent in this period.

Content of Toxic Chemicals in the Air of the Work Zone of Hothouses After Plant Treatment (in mg per cubic meter)

Ягохимикат (1)	Отбор проб воздуха (2)	(3) Число проб	(4) Время после обработки растений, ч		
			0	$2^{1}/_{2}$	5
(5) ДДВФ	Без (6) встряхивания растений	23	1,2±0,08	0,7±0,03	0,5±0,04
	Со встряхиванием (7)	25	1,4±0,09	0,88±0,05	0,6±0,03
(8) Цинеб	Без встряхивания растений (6)	22	0,87±0,09	0,68±0,07	0,54±0,05
	Со встряхиванием (7)	26	1,0±0,07	0,77±0,06	0,6±0,06
(9) Бенлат	Без встряхивания растений [1] (6)	48	0,15±0,01	0,1±0,02	0,07±0,01

(10) *Продолжение*

Ядохимикат (1)	Отбор проб воздуха (2)	(3) Число проб	(4) Время после обработки растений, ч			
			10	20	30	40
(5) ДДВФ	Без (6) встряхивания растений	23	0,17±0,02	0,01±0,001	0,0	0,0
	Со встряхиванием (7)	25	0,2±0,01	0,01±0,001	0,0	0,0
(8) Цинеб	Без (6) встряхивания растений	22	0,3±0,04	0,12±0,01	0,05±0,006	0,0
	Со встряхиванием (7)	26	0,34±0,03	0,12±0,02	0,05±0,004	0,0
(9) Бенлат	Без (6) встряхивания растений [1]	48	0,03±0,002	0,0	0,0	0,0

1. The solution of benlat was poured under the root of plants, that is, they were not sprayed with it, in connection with which the air was sampled only without plant shaking.

Key:
1. Toxic chemical
2. Air sampling
3. Number of samples
4. Time after plant treatment, hours
5. DDVP
6. Without plant shaking

/Key continued on following page/

7. With shaking
8. Zineb
9. Benlat
10. Continuation

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MARINE MAMMALS

UDC: 599.533.599.537

GEOMETRIC DISTINCTIONS OF THE BODY AND LINE DRAWING PLANS OF TWO SPECIES OF BLACK SEA DELPHINIDS AS RELATED TO THEIR HYDRODYNAMIC CHARACTERISTICS

Moscow BYULLETEN' MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY, OTDEL BIOLOGICHESKIY in Russian No 2, 1977 pp 62-66

[Article* by V. D. Burlakov, Zh. Ya. Grushanskaya and V. Ye. Sokolov]

[Text] The question of optimizing forms of bodies that move in water, from the standpoint of minimum hydrodynamic drag with retention of the required or specified volume is still a pressing one in hydromechanics. In this regard, it is of considerable interest to investigate the geometric characteristics of some marine mammals that swim in a specific range of Reynolds numbers Re, which is close to the Re range of a number of engineering [technical] objects ($Re = v \cdot L/\nu$, where v is the velocity of movement, L is typical linear dimension, for example body length, and ν is the coefficient of kinematic viscosity of water). It should be mentioned that limitation of the task set forth to the narrow range of Reynolds numbers was made on the basis of the results of studies of different marine animals and fish, and models thereof: there cannot be a universal optimum body shape adapted to different living and propulsion conditions. Each of the shapes known today is purposeful only for a specific range of Reynolds numbers corresponding to the living and propulsion conditions for a given live object. From this point of view, among marine mammals and fish, different species of delphinids, pinnipeds and some shark species are rather similar. They all move within a relatively narrow range of Reynolds numbers, $Re \simeq 10^7$, and as a result the geometric shape of their bodies is characterized by similar distinctions.

We had studied the line drawing plan and geometric characteristics of the Black Sea bottlenose dolphin (Tursiops truncatus) previously (Sokolov et al., 1972). In this work, we submit the line drawing plans and discuss the geometric characteristics of two other species of Black Sea delphinids: common dolphin (Delphinus delphis) and porpoise (Phocoena phocoena). The methods used to measure the animals and plot line drawing plans on the basis of the data obtained were analogous to those described previously (Sokolov et al., 1972).

*The editorial board wishes to thank N. V. Kokshayskiy for his assistance in preparing this article for publication.

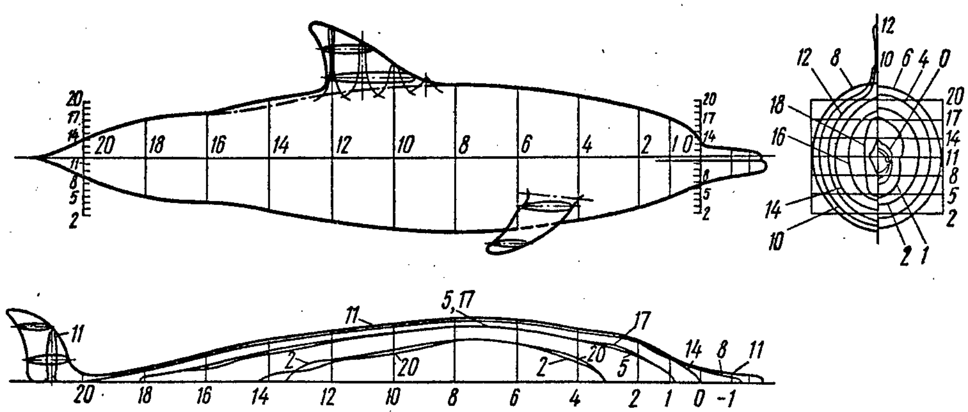

Figure 1. Line drawing of common dolphin. Explanation given in the text

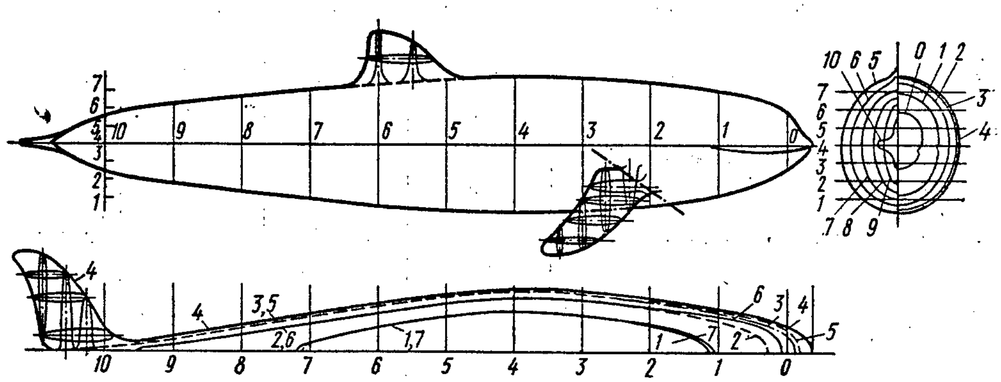

Figure 2. Line drawing of porpoise. Explanation is given in the text

Figures 1 and 2 illustrate line drawings of the two delphinid species, while the Table lists the main geometric characteristics of these animals. All of the characteristics are adjusted to a dimensionless form, i.e., related to the typical linear dimension (L_k is body length without rostrum, L_g is overall length of the animal's body). For the sake of convenience for comparison purposes, we included the corresponding characteristics of the bottlenose dolphin in the Table.

Analysis of the line drawings and figures listed in the Table reveals that the following main distinctions of geometric body shape are typical for all three species of Black Sea delphinids: absence of cylindrical part in the middle of the body; elongation in the range of $\lambda = 5 \div 5.5$ or, in other words, relative maximum thickness $d/l = 0.18-0.2$, and position of abscissa of maximum thickness at a distance of 0.4-0.5 from the rostrum.

Each of these distinctions should, apparently, be significant to optimization of shape, i.e., to obtain the required useful size [volume] with minimal hydrodynamic drag.

In order to determine the role of a tapered outline of the nasal part of the animal's body, we can use the following data (Hertel, 1967). Studies were made of three bodies of revolution with the same relative thickness $d/l = 0.12$: a) a body with a cylindrical insert taking up 45% of the total body length, dull bow and smoothly tapering conical stern; b) a body with close to elliptical profile of the bow, without a cylindrical insert; c) a body with close to parabolic bow, i.e., the most tapered, also without a cylindrical insert (Figure 3). Reynolds' number constituted $Re = 10^6$ for each of the bodies.

Main geometric characteristics of the common dolphin, porpoise and bottlenose dolphin

Parameters	Designation	Common dolphin	Porpoise	Bottlenose dolphin
Length of rostrum	$\frac{L_p}{L_k}$	0,092	—	0,05
Length of tail fin	$\frac{L_{xb}}{L_k}$	0,11	0,13	0,104
Maximum height of body (without dorsal fin)	$\frac{H}{L_g}$	0,215	0,176	0,209
Maximum body width	$\frac{B}{L_g}$	0,191	0,16	0,175
Elongation	$\lambda = \frac{L_k}{B}$	5,23	5,04	5,0
Degree of ellipticity	$\frac{B}{H}$	0,89	0,91	0,834
Area of tail fin	$\frac{S_{xb}}{L_k^2}$	0,0115	0,021	0,023
Area of dorsal fin	$\frac{S_{cn}}{L_k^2}$	0,00847	0,00676	0,0113
Area of pectoral flipper	$\frac{S_{zp}}{L_k^2}$	0,0076	0,00955	0,007
Area of wet surface of body with rostrum	$\frac{\Omega}{L_k^2}$	0,432	0,445	0,520
Area of maximum mid-section	$\frac{S_m}{L_k^2}$	0,0338	0,0429	0,0378
Total water displacement	$\frac{V}{L_k^3}$	0,017	0,016	0,0218
Abscissa of position of maximum width, from the nose	$\frac{X_B}{L_g}$	0,426	0,404	0,410
Angle of dorsal fin in relation to horizontal plane	$\alpha°$	34	39	36

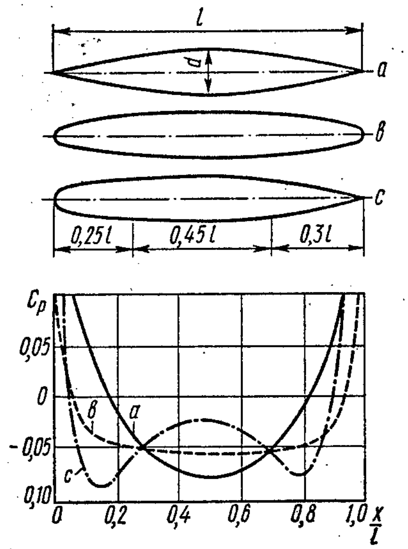

Figure 3.
Comparative distribution of pressure on three bodies of revolution with the same relative thickness $d/l = 0.12$.

X-axis, relative distance from front point of body; y-axis, pressure coefficient.

Explanation is given in the text.

A comparison of pressure diagrams [epures] on the surface of these bodies reveals that the third body has definite advantages; it has a tapered, "parabolic" bow. The region of negative pressure gradients occupies 0.5 of its length, and both pressure drop and elevation on the stern occur smoothly, whereas in the "cylindrical and "elliptic" bodies, the minimum pressure peak is at 0.15 of the body length, measured from the nose and subsequent pressure elevation occurs rather abruptly. As it is known in hydromechanics, these facts are indicative of longer streamlined section of the boundary layer on the "parabolic" body and lack of separations of the boundary layer, which perhaps is present on the other two bodies. In other words, the hydrodynamic drag of the "parabolic" body may be lower than the drag of the "cylindrical" and "elliptic" bodies. The fact that a tapered bow is a feature inherent in objects that move at considerable speed ($Re \simeq 10^7$) is confirmed in biology on the example of the trout. The trout, which is of the same relative thickness as swift-swimming mammals and fish, but with much blunter nose, close to elliptic in shape, swims at Reynolds numbers of $Re \leqslant 10^5$, i.e., at least 10^2 lower than objects with a pointed nose.

The role of the relative maximum thickness or elongation of the body, which is the same thing, has been mentioned before (Hertel, 1966). The relative maximum thickness of Black Sea delphinids--common dolphin, porpoise and bottlenose dolphin--is quite consistent with the same characteristics of the bodies of other swift-moving marine mammals and fish. Thus, the maximum relative thickness of the blue whale is $d/l = 0.21$, it is 0.26 in the Greenland right whale, 0.14-0.18 in different species of sharks, 0.24 in the sword fish, 0.22-0.23 in tunny (Beier, Glass, 1969) and 0.21 in the fur seal. This data confirm the previous finding that the bodies of various swift-swimming living organisms ($Re \simeq 10^7$) have a maximum relative thickness in the range of 0.17-0.24. Evidently, it can be assumed that these figures

characterize the most desirable [purposeful] shapes of bodies, which developed in the course of lengthy evolution. It is interesting to note the great resemblance between the schematic profiles of longitudinal sections of the bodies of marine mammals and fish and the profiles known in engineering that provide a high lifting capacity (Hertel, 1966).

To describe the net ["useful"] volume of the bodies in question, one can use the shape coefficient:

$$\eta = \frac{V^{2/3}}{\Omega}$$

where V is total water displacement, or body volume and Ω is the area of wet body surface. In addition, the coefficient $K = \eta/c_x$, where c_x is the coefficient of hydrodynamic drag $X/\rho v^2/_2 \cdot V^{2/3}$, can serve as a parameter characterizing the objects under study from the standpoint of correlation between hydrodynamic drag and net volume.

The values of shape factor η and coefficient $K = \eta/c_x$ for the three species of Black Sea delphinids, two bodies of revolution with a cylindrical insert and close to elliptic bow and a body of revolution with parabolic bow and without a cylindrical insert are as follows:

	λ	$\eta = \frac{V^{2/3}}{\Omega}$	$K = \frac{\eta}{c_x}$
Bottlenose dolphin	5,72	0,150	5,0
Common dolphin	5,23	0,154	5,14
Porpoise	5,04	0,126	4,2
Body of revolution with small cylindrical insert	8,3	0,107	3,56
Body of revolution with large cylindrical insert	9,7	0,102	3,41
Body of revolution with parabolic outline of nasal portion (according to Hertel, 1967)	4,5	0,160	5,34

We considered C_x to equal 0.03 in calculating coefficient K, which corresponds to the results we obtained in wind tunnel tests of a solid model of a bottlenose dolphin and bodies of revolution with a cylindrical insert.

According to the discussion of the figures submitted, there is a definite advantage to bodies with a profile close to the profiles of swift marine mammals and fish. In other words, bodies with a "parabolic" bow without a cylindrical insert, the relative maximum thickness of which (d/l = 0.17-0.24) is situated at a distance of 0.4-0.5 from the tip of the body, can be considered the best adapted for propulsion in the range of Reynolds numbers $Re = 10^7$, from the standpoint of retaining the maximum net volume with low hydrodynamic drag.

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SCIENTIFIC ORGANIZATION OF LABOR AT THE SANITAS CHEMICAL-PHARMACEUTICAL FACTORY

Moscow FARMATSIYA in Russian No 3, 1977 pp 42-43

[Article by G.E. Dudenas and A. Pashkauskene]

[Text] At the Sanitas Chemical-Pharmaceutical Factory, a communist labor enterprise, a group was established to study and introduce elements of scientific organization of labor (NOT), which included chief specialists, supervisory workers and outstanding workers, and the deputy chief engineer was designated responsible for the group's work.

NOT at the factory is broken down into six main directions: distribution and norm-setting of the work, equipment for the work places, work conditions (design, lighting, etc.), office work and information service, mechanization and automation of the work and sociological measures.

In the ampoule shop, for production, the glass tubes and some types of raw materials were placed as close together as possible. This considerably reduced the labor input for intraplant transport work and greatly improved the storage. Before arriving at the production sections, the outer packing of the glass containers is cleared away or removed.

Individual operations have been demarcated at the ampoule and other sections. The facilities for washing, filling and sealing are closely connected with each other, and the ampoules from one facility are turned over to another through transfer cabinets in the walls. As a result, there is less possibility of mechanical contamination, and labor productivity has also increased. When the ampoules are sealed on ordinary machines, light-shields are set up --this protects the workers' eyes from becoming overtired.

The automatic machines for sterilizing the ampoules are located between the sealing room and the sterilization room. In these same autoclaves, checks are made of the hermetic sealing of the ampoules, by using a staining fluid, and the ampoules are also washed with desalinated water.

The packaging of the ampoules is mechanized at almost all the sections by introducing automatic machines for packaging the AFM-type ampoules, made

at the factory. When these automatic machines were developed, attention was directed to designing maximal convenience for the workers servicing them. The seats installed can be shifted manually to the necessary distance from the automatic machine, and the height of the seat can be adjusted as necessary.

At all stages of ampoule production, each worker is issued special coupons with an indication of his shift and number. These coupons go with the case with the ampoules up to where they are packed.

To pack the finished product, we use cardboard cartons instead of wooden boxes, which has provided a great saving and has reduced the need for labor forces over half. An automatic machine has been put into operation to glue the cartons, as the result of which labor productivity for this operation has increased 200 percent.

In the ampoule shop the rooms for the foremen of the section are located so that the foreman can observe the most critical production processes. In addition, the work place of the foreman is sound-proof, well lighted and has convenient work tables and document cabinets.

The section assigned for small-series ampoule preparation is used to make ampoule preparations for small orders, as well as preparations for which the preparation process requires more specific conditions. This section is also adapted for output of powerful agents. This is where they make ampoules with aloe extract, and the necessary raw material is cultivated in the factory's hothouse. Air from the ventilation of the other production facilities is used to warm the hothouse.

Since 1976, the work at the glass-blowing section has been organized according to the principle of expanded service areas, and as a result, labor productivity has increased by 42 percent. The semi-automatic Ambeg machines are placed so that the workers can see the entire production process with minimum effort.

The structure at the raw materials warehouse for special alcohol storage, with a capacity of 75 tons, supplied with engineering lines, measuring tanks and a closed system for sending the alcohol to the shop eliminated the need for auxiliary workers, reduced the loss of alcohol and improved its transport. The time for supplying the alcohol to the shop was reduced by 75 percent, which gave a saving amounting to 18,000 rubles.

With a view to a saving in the use of the production areas, the line conveyer for packing the liquid was converted to a circular one, as the result of which compactness and convenience in operation was achieved.

In order for the packaging material to arrive at the packaging department of the galenics packaging shop dry, it was held in drying facilities at a temperature of 60-70°C. This is hard and labor-intensive work. Steam condensation machines have now been installed to wash and dry the beakers

and vials with a capacity of 30-50 ml. A conveyor that feeds the dry vials directly to the packaging division is attached to the machine.

The finished output from the galenics-packaging shop is transported to the warehouse, which is located 50 meters from the shop, along an overhead trolley by an automatically controlled trolley container. As a result, the work conditions for the auxiliary workers and the shop's sanitation conditions have improved.

Over 350 persons working at the factory are efficiency experts; during the Ninth Five-Year Plan they introduced 666 efficiency proposals, the assimilation of which gave a saving amounting to 924 rubles.

An experimental-production division is working at the factory, engaged in obtaining and testing new preparations and developing new technology. A section for aseptic preparation of injection solutions in the ampoules and for lyophilic drying has been set up in the division. An industrial laboratory, where the students of the Kaunas Medical Institute do practical work, has been equipped. The experimental-production division does its research work in this laboratory.

The work places at the enterprise correspond to the construction and sanitation norms. The artistic council at the NOT Committee is concerned with the routine repair of the facilities, with adherence to the norms for selecting the lighting, arranging the equipment, etc. The shops are equipped with leisure areas for the workers. At the same time, these spacious, light, comfortable facilities are used for the work of the political education circles, communist labor schools, for holding production conferences, etc. Students of the 9th and 10th classes of the secondary evening school work at the factory facilities.

Every year there are competitions to ascertain the best person in his vocation, the experience of the leading workers is summarized and disseminated among all the workers of the enterprise. Competitions are held among the engineering and technical personnel on economic knowledge, labor legislation and other topics.

Sociological studies are made to determine the correct assignment of the workers, in consideration of their work qualities and character traits in conjunction with the Kaunas Medical Institute, and this makes it possible to make recommendations on specialized employment.

Everything positive that has been done at the factory to introduce NOT is contributing to the successful fulfillment of the goals of the Tenth Five-Year Plan.

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SCIENTIFIC ORGANIZATION OF LABOR AT PHARMACEUTICAL INSTITUTIONS IN SVERDLOVSKAYA OBLAST

Moscow FARMATSIYA in Russian No 3, 1977 pp 44-45

[Article by A.D. Apazov; T.S. Karpenko; L.N. Polishchuk; and N.P. Rusina, Pharmaceutical Administration of the Sverdlovsk Oblispolkom]

[Text] The oblast pharmaceutical association, by utilizing the experience of the industrial enterprises of Sverdlovsk, in accordance with the planned procedure, has been studying problems of scientific organization of labor (NOT) since 1966.

In accordance with the experience of the Sverdlovsk Instrument Plant, the NOT council first worked out the basic directions and an approximate plan for NOT, on the basis of which the major pharmacies developed their own corresponding plans, and the next stage of this work was the establishing of comprehensive plans for NOT, encompassing all aspects of work of the pharmaceutical institutions.

The NOT tasks include an improvement in the organizational structure of the administration of the pharmaceutical management and organization of labor, mechanization of production processes, an improvement in work conditions and work with personnel (tutorials, vocational orientation).

The implementation of measures for each of the directions listed yielded positive results.

The first stage of improving the organizational structure of the administration of the pharmaceutical services consisted of studying the existing structure and developing a new one and working out the positions of the administrative divisions, and the commitments of each specialist on the administrative staff were also determined, which made it possible to raise the level of management of the pharmaceutical network.

In order to introduce advanced norms for management at the Pharmaceutical Administration, a collective supervisory organ--the board--was established in 1969. Future and current problems of the provision of medicine for the

population are solved at its meetings, which has made it possible to abolish the pharmaceutical and administrative-management councils and the balance and inventory committees.

The organization of the pharmaceutical network was also improved along with the structure of the administration. In 1968 the oblispolkom approved the regulations of the Central Municipal (Rayon) Pharmacy, as applied to the conditions of the industrial rayons of the oblast. Regionalization of all the pharmacies in the oblast was implemented on its basis. All 53 central rayon pharmacies (TsRA) were converted to full economic accountability, and the accounting was centralized and an order-record system of bookkeeping was introduced in them.

This considerably increased the responsibility of the directors of the pharmacies and expanded their rights in solving economic problems. The authority of the pharmaceutical workers in soviet and party organs grew. The ispolkoms approved all the leaders of the TsRA in this position and the deputies of the local soviets--the 26 chiefs.

Subordinating the TsRA to the local soviets and converting them to full economic accountability made it possible to abolish the Irbitskiy Inter-rayon Office and reduce its administrative-managerial personnel by nine units, with a yearly wage fund of 13,500 rubles.

Since 1972 the pharmacies of Pervoural'sk, in accordance with the procedure of the experiment, have been under the jurisdiction of the gorispolkom. The economic management of the gorispolkom has facilitated favorable solutions by the TsRA of problems of consolidating and developing the material-technical base of its subdepartmental pharmacies.

One of the basic directions in the work of the NOT Council for Pharmaceutical Administration is improving the forms and methods of medical provision for the population and improving the standards and quality of the service. With a view to this, during 1974-1975 the NOT groups of the Sverdlovsk pharmacies and the administrative staff began to provide the population with preparations received in the pharmaceutical network in limited amounts. The result of the work done was the establishment, on the base of the Central Pharmacy No 1, of a special information center, the task of which is not only to issue information to the population, but also full information of the pharmacies on the availability and perspectives for receiving preparations that are temporarily lacking in the pharmaceutical network. The center has at its disposal an automated information unit for 100 descriptions of preparations and a card system of the location of the Sverdlovsk pharmacies.

For the daily information of the physicians, all the therapeutic-polyclinic institutions are attached to certain pharmacies, which are obliged to give reliable service to those asking for prescriptions written out by the polyclinic attached. Someone from the administration is on duty at the

pharmacies throughout the entire work day, and in a number of pharmacies the work place of the administrator on duty is in the salesroom. The administrators on duty and the workers at the information bureau have printed check-orders of the applicants for prescriptions in the other pharmacies in the city; the number and address of the pharmacy and the transport to get to it are indicated on these orders.

Up to 1972, long lines at the cashier's and the divisions could be seen at the major pharmacies in Sverdlovsk. In order to improve the work organization and accelerate the service, these pharmacies converted to a new form of service--the prescription clerk, non-prescription clerk and optician combined their work with the duties of the cashier. The NOT Council of the Pharmaceutical Administration studied the new form of work of the pharmacies and recommended that it be put into operation in the large pharmacies, after preliminary agreement on this question with the obkom of the trade union of medical workers. It has now been adopted by 16 pharmacies in Sverdlovsk, as the result of which the lines at them have become shorter, since those seeking prescriptions no longer need to go to the section twice and to the cashier once, and the efficient service for the customers has resulted in improving the sales of medical items. In addition, 18 cashier units were also freed, and by eliminating the cashiers' booths, the esthetic appearance of the salesrooms was improved.

As the most improved method of service for the population, Pharmacy No 315 in Pervoural'sk introduced the office form of customer service, in which the pharmacy serves the patient as a public health institution, and not simply a sales center.

The NOT pharmacy group made an inquiry by questionnaire of the customers and workers regarding this form of service. Most of those questioned consider it to be successful. While awaiting their turn in the office, the customers may become familiar with the albums of "Useful Advice." The calm, businesslike atmosphere in the office reduces the probability of errors in fixing the prices of the prescriptions and issuing the medicines and makes it possible to answer all the patient's possible questions.

The Pharmaceutical Administration pays great attention to problems of improving the work conditions of the pharmaceutical workers and raising its productivity.

Efficient organization of the work places is very important from this standpoint. First of all, the work places of the prescription and non-prescription workers were equipped in a new way. The new equipment is convenient, esthetic and considerably facilitates the work. The Pharmaceutical Repair and Construction Administration manufactures it.

Most of the newly opened and renovated pharmacies are designed and equipped in accordance with the requirements of NOT and esthetics. This work is done by the Architectural-Artistic Council of the Pharmaceutical Administration, the staff of which includes pharmaceutical workers, architects and artists.

Increased labor productivity is unthinkable without the mechanization of the production processes. Over 130 mechanized devices and various instruments and attachments are used in the oblast pharmacies.

In 1971-1975, the work of the Office of Rationalization and Inventions and the NOT Council in mechanization was directed toward centralized provision of mechanical devices for all the pharmaceutical institutions, and in this period the network received a total of 25 types of devices for mechanization, amounting to over 10,000 units.

It should, however, be noted that the fact that the Pharmaceutical Administration lacks its own production base to manufacture small-scale devices for mechanization hinders this process.

The chief industrial enterprise leaders--Uralmashzavod, the Uralasbest Combine, the Pervoural'skiy Plant for New Pipes, etc.--are of definite assistance to the individual pharmacies in acquiring and manufacturing devices for mechanization.

In order to increase the creative activity of the workers in this sphere, the Office of Rationalization and Inventions of the Pharmaceutical Administration, beginning in 1970, has been holding oblast inspection-competitions of the mechanization of the production processes. The results of the inspections are summarized, and are sent to the pharmacies and the enterprises in the form of recommendations for the introduction of individual elements of mechanization and proposals by efficiency experts. An assortment list of devices for small-scale mechanization for pharmacies of different categories has been compiled.

The successful solution to the problems facing the pharmaceutical workers depends on the level of their professional training and creative activity.

The Pharmaceutical Administration has a permanent school of organizers of pharmaceutical work and lecturers, with the scientists of medical and pharmaceutical VUZ's participating in the work, and a correspondence school to improve the work skills of rural pharmacists, with 300 students enrolled.

A tutorial has been developed in the pharmacies of the oblast, and the most experienced associates work with the young people, and councils of tutors have been established.

Work is being done for vocational orientation of the students at the facilities of the Sverdlovsk Educational-Production Combine by the Pharmaceutical Administration. The result of the explanatory work with the young people in the oblast and the vocational orientation of the students was the admission of 220 persons to the Perm Pharmaceutical Institute in the Ninth Five-Year Plan.

The young specialists who visit the pharmaceutical collectives take the oath of a pharmaceutical chemist in a ceremonial atmosphere, and they are handed the white gown, certificate and badge of a pharmaceutical worker of Sverdlovskaya Oblast.

The forms of socialist competition and the movement toward a communist attitude toward work are constantly being improved. Competition of the central rayon pharmacies, pharmaceutical warehouses, pharmaceutical centers of the second group, control-analytical offices and centralized bookkeeping offices has been organized in the oblast. The results of the competition of the central rayon pharmacies and the pharmaceutical warehouses are approved quarterly by the oblispolkom and the oblast council of trade unions, and of the centralized bookkeeping offices and control-analytical offices--by the obkom of the trade union of medical workers and the board of the pharmaceutical administration.

The purposeful and systematic work done to introduce elements of NOT in the pharmaceutical institutions and at the enterprises of Sverdlovskaya Oblast have helped to improve the organization of many sections of their work and have had a favorable effect on the economic indicators achieved by the pharmaceutical administration.

With a view to the successful fulfillment of the tasks of raising the quality of medical aid to the population, in the future too we will improve the organizational and economic methods of the work.

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LATVIAN MICROBIOLOGY SOCIETY ACTIVITIES DESCRIBED

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[Article by Yu. Yakobson: "Latvian Republic Division of the All-Union Microbiology Society"]

[Text] Preparations for the organization of the All-Union Microbiology Society (VMO) were begun as early as 1957 at the initiative of the country's leading specialists headed by Academician of the USSR Academy of Sciences A. A. Imshenetskiy. The organizational congress of the All-Union Microbiology Society of the USSR Academy of Sciences was held in Moscow in 1960. Participating as delegates representing microbiologists of our republic were E. A. Linde and Yu. O. Yakobson.

The VMO comprises all microbiologists and other specialists working in the field of general and applied microbiology. Constituting an exception are medical microbiologists who are included into the All-Union Society of Epidemiologists and Microbiologists imeni I. I. Mechnikov.

The basic tasks of the VMO include the rendering of all possible assistance in the development of microbiology and the recruitment of scientists and practitioners for the resolution of tasks that are connected with the building of communism, as well as the ideological indoctrination of society members, according them assistance in improving their level of qualifications, the popularization and propagation of knowledge and of the latest achievements in the area of theoretical and applied microbiology.

The Latvian Republic Division of the VMO was created in 1958 on the basis of a decision taken by the presidium of the Latvian SSR Academy of Sciences (the session of the presidium of the Latvian SSR Academy of Sciences of 31 October 1958).

The initiator of its creation was Academician A. M. Kirkhenshteyn, who, until the end of his life (1963) was a chairman of the council

of the Division. One should note that there exists in the republic specific traditions in the joining of various specialists into the scientific society. In accordance with the charter, the VMO consists of full members of the society, honorary members and collective members. The Latvian Republic Division of the VMO at the present time numbers more than 150 full members who are working at the Latvian SSR Academy of Sciences Institute of Microbiology imeni August Kirkhenshteyn, the Latvian State University imeni Petr Stuchki, the Latvian Agricultural Academy, the Latvian Scientific-Research Institute for Agriculture and Agricultural Economy, the Scientific-Production Association "Biokhimpreparat," as well as scientists working at the Experimental Plant for Biochemical Preparations, the Livan Experimental Biochemical Plant, the Plant for Medical Preparations, and at several other institutions.

Elected honorary members for our division at congresses of the VMO were A. M. Kirkhenshteyn (1960), A. D. Kalnin'sh (1968), R. A. Kukayn (1975), and M. Ye. Beker (1975). There are three collective members within the division: the Latvian SSR Academy of Sciences Institute of Microbiology imeni August Kirkhenshteyn, the Latvian SSR Academy of Sciences Experimental Plant for Biochemical Preparations, and the Livan Experimental Plant for Biochemical Preparations of the Main Administration for Biochemical Preparation Production.

Within its work the Latvian Republic Division of the VMO works in close cooperation with the Institute of Microbiology and its scientific council as well as with the departments for plant physiology and microbiology of the Latvian State University, the Latvian Agricultural Academy, the plant collectives of the Experimental Plant for Biochemical Preparations and the Livan Experimental Biochemical Plant as well as with a number of scientific societies. However, a most close tie is implemented with the Republic Problem-Coordination Council for Problems in Physiology and the Biochemistry of Microorganisms. The collectives' support of those institutions to a large measure determines the successful activity of the division and the undertaking of both independent as well as joint measures.

The VMO and the Latvian Republic Division utilize various forms of operations--the organization of conferences, symposia, ceremonial sessions, the conduct of scientific topical sessions; the division participates also in publications and the propagation of scientific knowledge.

The division participated in the organization and conduct of conferences and symposia which took place in Riga with such topics as the role of the first bacteriological institutions in the development of microbiology and epidemiology in Russia (1963), the biosynthesis of amino acids, vitamins and microbe biomass (1964), methods for

microbiological growth stimulus and plant development (1969), anabiosis and pre-anabiosis of microorganisms (1971), and the microbiological synthesis of lysine (1974).

The Society has been devoting particular attention to the organization of conferences for young specialists, and has cooperated in this effort with the republic section of virologists of the All-Union Society of Microbiologists and Epidemiologists imeni I. I. Mechnikov and the Council for Young Scientists at the Institute of Microbiology imeni August Kirkhenshteyn of the Latvian SSR Academy of Sciences. The first such conference at the initiative of the young scientists was conducted in 1967. From that time to the present day eight such conferences have taken place including the Anniversary Conference for Young Scientists which was dedicated to the 50th anniversary of the Lenin Komsomol (1968), the Conference for Young Specialists dedicated to the 100th birthday of V. I. Lenin (1970), the Conference of Young Scientists dedicated to the 100th birthday of Academician of the Latvian SSR Academy of Sciences A. M. Kirkhenshteyn (1972), as well as the Conference on Problems in Microbiology and Virology (1975). Participating in that conference were representatives from other republics as well. The last conference for young scientists was held in April 1977.

A new innovation in the activity of the Society's division has been the organization of schools. Thus, in 1975, together with a number of organizations, including the Institute of Microbiology imeni August Kirkhenshteyn and the Latvian SSR Academy of Sciences Institute for Organic Synthesis there was conducted a school "The Structure and Functions of Biological Membranes," in which work approximately 360 representatives of various institutes and VUZ's participated from Moscow, Bushchin-on-the-Oka, Gor'kiy, Tbilisi, Yerevan, Minsk, and other cities. In addition in 1977 there was conducted a school for molecular genetics. One should note that the Central Council of the VMO, since the formation of the Society, has been regularly conducting various schools for young specialists.

Annually in September, beginning with 1964, there have been organized ceremonial sessions dedicated to the memory of A. M. Kirkhenshteyn (1872-1963). In the first years those sessions were dedicated exclusively to A. M. Kirkhenshteyn and his scientific legacy, for example: recollections of Kirkhenshteyn, Kirkhenshteyn as a teacher of young scientists, the researcher A. M. Kirkhenshteyn in the structure and development of bacteria and others. That period was concluded in 1972--the anniversary of A. M. Kirkhenshteyn's 100th birthday, when there was held a joint ceremonial session between the Latvian SSR Academy of Sciences and the All-Union Microbiology Society which included the following papers: "The Scientific and Public Activity of A. M. Kirkhenshteyn" (Academician of the Latvian

SSR Academy of Sciences P. I. Valeskaln); "Prospects for the Development of Microbiology" (corresponding member of the USSR Academy of Sciences M. N. Meysel'); "A. M. Kirkhenshteyn and the Problems of Vitaminology" (corresponding member of the USSR Academy of Sciences V. N. Bukin); "The Progressive Ideas of A. M. Kirkhenshteyn in the Area of Rational Nutrition" (Academician of the Latvian SSR Academy of Sciences A. A. Shmidt) and "The Scientific Achievements of the Institute of Microbiology imeni August Kirkhenshteyn of the Latvian SSR Academy of Sciences" (Academican of the Latvian SSR Academy of Sciences R. A. Kukayn), as well as a ceremonial joint session between the Institute for Microbiology imeni August Kirkhenshteyn, the Latvian Republic Division of the VMO and the Latvian Republic Section of the All-Union Society for Microbiologists and Epidemiologists imeni I. I. Mechnikov in which the paper was presented "August Kirkhenshteyn--The Founder of Microbiology in Latvia" (Yu. O. Yakobson).

Beginning in 1973 there has been conducted annually in September Kirkhenshteyn lectures which are dedicated to reviewing the contemporary state and future of the development of vital problems in microbiology and virology. In 1973 there was held a session which presented the paper by R. A. Kukayn of the Latvian SSR Academy of Sciences "Environmental Factors as Activators of Latent Cancer Viruses"; in 1974 in which there was a paper presented by corresponding member of the Latvian SSR Academy of Sciences M. Ye. Beker "Certain Aspects of Anabiosis in Microorganisms"; in 1975 there was a conference in which there was presented a paper by Doctor of Medical Sciences A. Ya. Mutseniyetse "The Teaching of A. M. Kirkhenshteyn Concerning Immunology in Concepts of Contemporary Virology and Oncology"; in 1976 there was a paper presented by candidate of medical sciences G. Ya. Feldman "Interferon--A Factor of Non-Specific Organism Resistance."

Special sessions have been concerned with important historical dates: the 50th anniversary of the formation of the Soviet Union and the 250th anniversary of the USSR Academy of Sciences; sessions dedicated to I. I. Mechnikov (in connection with his 125th birthday); Louis Pasteur (in connection with his 150th birthday); Antony van Leeuwenhoek (in connection with the 250th anniversary of his death); K. I. Gel'man (in connection with his 125th birthday); M. A. Novitskiy--the founder of experimental oncology (in connection with the 100th anniversary of experimental oncology). In 1975 there was conducted a session in honor of the 80th birthday of honorary member of the VMO A. D. Kalnin'sh. Several of these sessions were conducted jointly with other societies, for example, with the Latvian Biochemical Society, and with the participation of the Biological Commission of the Scientific Medical Council for the Propagation of Natural Sciences of the Society "Znaniye" of the Latvian SSR.

In connection with the 150th birthday of Louis Pasteur there was issued a special jubilee medal which was awarded to scientists and

industrial workers for special services in the development of microbiology and for the scientific-administrative and scientific-public activity. Among persons awarded that medal were microbiologists of our republic: R. A. Kukayn, M. Ye. Beker, A. D. Kalnin'sh, Ya. P. Stradyn', R. Ya Karklin'sh, A. K. Sedvald, A. A. Latsar, and Yu. O. Yakobson.

The scientific sessions of the Society are concerned with various vital problems of microbiology and virology. For example: "Interferon: Facts, Theory and Prospects"; "Basic Principles for the Systematics of Microorganisms"; "Microbiological Transformations of Nucleotides"; "Microbial Catabolism of Carbohydrates"; "The Defensive Reactions of an Organism Against Viral Infections"; "Chemical Mutagens and Their Activity"; "The Biological Fixation of Atmospheric Nitrogen"; "The Characteristics of Raw Material for the Cultivation of Microorganisms" and others.

Frequently participating in the sessions of the Divison are leading specialists from the central scientific institutions of the Soviet Union. Appearing on more than one occasion with papers at the Division were Ye. L. Ruban, M. N. Meysel', A. M. Bezborodov (Moscow); appearing also at sessions of the Division and presenting papers were V. I. Biryuzova, L. G. Loginova, I. D. Robotnova, D. I. Nikitin, Ya. I. Rautenshteyn, S. V. Shestakov (Moscow); A. B. Lozynov, I. S. Kulayev (Pushchino-on-the-Oka); N. S. Pechurkin (Krasnoyarsk); Yu. M. Voznyakovskaya (Leningrad); B. I. Bilay (Kiev) and others. Among foreign guests who presented papers were: Dr. E. Zelinkova (Czechoslovakia), Dr. R. Kundzinya, and Dr. L. Ericson (USA).

The members of the Society report at the Division about their own participation in the all-union and international conferences and about their overseas assignments.

A number of sessions of the Division were conducted jointly with the Coordinating Council for Problems in Physiology and the Biochemistry of Microorganisms for the purpose of coordinating and organizing complex research in the biosynthesis of biologically active substances, the creation of amino acid and enzyme preparations as well as the intensification of agriculture and others.

The members of the Society have been actively participating in the propagation of scientific knowledge and the achievements of microbiology. One should note that the board of the All-Union Society "Znaniye" awarded Academician of the Latvian SSR Academy of Sciences R. A. Kukayn the N. I. Vavilov medal for a substantial contribution to the propagation of scientific achievements. The members of the Microbiology Society have been actively participating in the work of the scientific-methodological councils of the society "Znaniye" of

the Latvian SSR (M. Ye. Beker, M. K. Indulen, and others). The members of the Republic Division of the VMO have published a number of popular scientific and practical brochures in the Latvian language: "Microorganisms in Agriculture" (1961), "Vitamins and Their Sources in Nature" (1963), "The Primary Processing of Fruits and Berries" (1964), "Utilization of Antibiotics to Protect Plants and in the Storage of Fruit Products" (1965), "Amino Acids, Their Significance and Means of Production" (1966), "Sources of Mineral Waters and Therapeutic Mud" (1966), "The Utilization of Wild Fruits and Berries" (1967), "Carotin" (1973), "Industrial Microbes" (1975).

Also published were the topical materials of all of the preceding conferences. At the initiative and with the active participation of the Division and the involvement of a broad circle of specialists there was compiled a dictionary of microbiological terms in the Latvian and Russian languages whose draft was prepared in 1968 and the dictionary itself was published in 1971. All of the publications put out by the division up to 1969 have been reflected in the bibliography of the Latvian SSR Academy of Sciences Institute of Microbiology imeni August Kirkhenshteyn.

The Central Council puts out a special information bulletin of the VMO which reflects also the activity of the divisions of the Society. So far there have been published nine issues of that bulletin. In addition, the VMO, together with the USSR Academy of Sciences Institute of Microbiology has been regularly publishing the publication USPEKHI MIKROBIOLOGII (Progress in Microbiology). The last 12th issue of that publication came out in 1976.

Representatives of the Latvian Republic Division have been participating in the work of the leading organs of the Society. Thus, in 1975 elected to the Central Council of the VMO were R. A. Kukayn, M. Ye. Beker, Yu. O. Yakobson, and elected to the Central Review Commission were R. K. Ozolin', and elected vice president of the VMO was corresponding member of the Latvian SSR Academy of Sciences M. Ye. Beker.

In this way, the Latvian Republic Division of the VMO has undertaken a specific amount of work. However, this work must be significantly expanded; the forms of that work must also become more diversified. In organizing the daily operations one must take cite of the fact that the next congress of the VMO is slated to take place in Riga in 1980.

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